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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/618,262	07/11/2003	Gregory Allen Sotzing	UCT-0048	3919
23413	7590	01/11/2006	EXAMINER	
CANTOR COLBURN, LLP 55 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002			WONG, EDNA	
			ART UNIT	PAPER NUMBER
			1753	
DATE MAILED: 01/11/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/618,262

Applicant(s)

SOTZING, GREGORY ALLEN

Examiner

Edna Wong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

The indicated allowability of claims **1-17** is withdrawn in view of the reference(s) to **Lee et al.** ("Poly(thieno[3,4-b]thiophene). A New Stable Low Band Gap Conducting Polymer", *Macromolecules* (2001), Vol. 34, pp. 5746-5747). Rejections based on the reference(s) follow.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims **1-9 and 16-17** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 20-23 of copending Application No. 10/193,598 (Sotzing et al.). Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject

matter claimed in the instant application is fully disclosed in the referenced copending application and would be covered by any patent granted on that copending application since the referenced copending application and the instant application are claiming common subject matter, as follows:

reacting thieno[3,4-b]thiophene in the presence of a polyanion and an oxidant under reaction conditions sufficient to form the polymer comprising polymerized units of thieno[3,4-b]thiophene.

The invention claimed in claims 1-9 and 16-17 in the instant application fail to be patentably distinct from the invention claimed in claims 20-23 of the copending application because the independent claims in the instant application recite similar limitations, either alone or in combination with their dependent claims, as that of the claims in the copending application wherein the claims in the instant application are encompassed by the claims in the copending application. Therefore, the claims would have been an obvious variant over each other.

The reacting recited in claim 20 of the copending application is the genus to the species of electrochemically reacting in claim 1 of the instant application.

The oxidant recited in claim 20 of the copending application is the same as the anode of the electrochemically reacting recited in claim 1 of the instant application, or the oxygen in the air of an open electrochemical cell.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims **1-3 and 5-8** are rejected under 35 U.S.C. 102(a) as being anticipated by **Lee et al.** ("Poly(thieno[3,4-b]thiophene). A New Stable Low Band Gap Conducting Polymer", *Macromolecules* (2001), Vol. 34, pp. 5746-5747).

Lee teaches a process comprising electrochemically reacting a monomeric composition comprising thieno[3,4-b]thiophene, to form a polymeric composition comprising units derived from the thieno[3,4-b]thiophene (page 5746, lines 42-51).

The electrochemical reaction is in an electrochemical cell comprising an electrolyte (= a tetrabutylammonium perchlorate/acetonitrile solution), a working electrode (= a platinum button working electrode), a counter electrode (= a platinum flag counter electrode), and a reference electrode (= a Ag/Ag⁺ nonaqueous reference electrode) in operable communication (page 5746, lines 42-51).

The working electrode is a platinum, gold, or vitreous carbon working electrode (= a platinum button working electrode) [page 5746, lines 42-51].

The electrolyte is tetrabutylammonium perchlorate/acetonitrile (page 5746, lines 42-51).

The reaction provides the polymeric composition on an indium tin oxide substrate

(page 5746, lines 64-67).

The process further comprises reducing the polymeric composition (page 5747, lines 6-9).

The polymeric composition has a band gap of about 0.85 V (page 5747, lines 35-39).

The polymeric composition is transparent (= transmissive) [page 5747, lines 26-27].

Since Lee teaches all of the limitations recited in the instant claims, the reference is deemed anticipatory.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

I. Claims **4 and 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Lee et al.** ("Poly(thieno[3,4-b]thiophene). A New Stable Low Band Gap Conducting Polymer", *Macromolecules* (2001), Vol. 34, pp. 5746-5747) as applied to claims 1-3 and 5-8 above.

Lee is as applied above and incorporate herein.

The process of Lee differs from the instant invention because Lee does not disclose the following:

a. Wherein the working electrode is a vitreous carbon electrode, as recited in claim 4.

The invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the platinum button working electrode described by Lee with wherein the working electrode is a vitreous carbon electrode because working electrodes can comprise many different materials in the art. It is not inventive to discover the optimum or workable materials by routine experimentation. Thus, a vitreous carbon electrode appears to be a mere optimization which solves no stated problems and produces no unexpected results, unless proven otherwise.

b. Wherein the polymeric composition has no observable color in the oxidized form, as recited in claim 9.

The invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because similar processes can reasonably be expected to yield products which inherently have the same properties. *In re Spada* 15 USPQ 2d 1655 (CAFC 1990); *In re DeBlauwe* 222 USPQ 191; *In re Wiegand* 86 USPQ 155 (CCPA 195).

II. Claims **10-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Lee et al.** ("Poly(thieno[3,4-b]thiophene). A New Stable Low Band Gap Conducting Polymer", *Macromolecules* (2001), Vol. 34, pp. 5746-5747) as applied to claims 1-3 and 5-8 above, and further in view of **Lazzaroni et al.** (US Patent No. 4,663,001).

Lee et al. is as applied above and incorporated herein.

The process of Lee differs from the instant invention because Lee does not disclose the following:

a. Wherein the monomeric composition further comprises a co-monomer reactive with the thieno[3,4-b]thiophene, as recited in claim 10.

Lazzaroni teaches that electroconductive polymers based on mixtures of monomers depend on the properties desired in the resultant copolymers (col. 3, lines 33-50).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the monomeric composition described by Lee with wherein the monomeric composition further comprises a co-monomer reactive with the thieno[3,4-b]thiophene because electroconductive polymers based on mixtures of monomers are conventional in the art depending on the electrical and mechanical properties desired in the resultant copolymers as taught by Lazzaroni (col. 3, lines 33-50).

b. Wherein the co-monomer is a thiophene, substituted thiophene,

substituted thieno[3,4-b]thiophene, dithieno[3,4-b:3',4'-d]thiophene, bithiophene, pyrrole, substituted pyrrole, phenylene, substituted phenylene, naphthalene, substituted naphthalene, biphenyl, substituted biphenyl, terphenyl, substituted terphenyl, phenylene vinylene, substituted phenylene vinylene, or a combination comprising at least one of the foregoing co-monomers, wherein the substituents are one or more of -H, hydroxyl, C₆-C₃₆ aryl, C₃-C₆ cycloalkyl, C₁-C₁₂ alkyl, halogen, C₁-C₁₂ alkoxy, C₁-C₁₂ alkylthio, C₁-C₁₂ perfluoroalkyl, C₆-C₃₆ perfluoroaryl, pyridyl, cyano, thiocyanato, nitro, amino, C₁-C₁₂ alkylamino, C₁-C₁₂ aminoalkyl, acyl, sulfoxyl, sulfonyl, amido, and/or carbamoyl, as recited in claim 11.

Lazzaroni teaches that possible comonomers are aromatic and heterocyclic comonomers having 5 to 6 members, such as aniline, pyrrole, thiophen (and their substituted derivatives) and vinyl monomers such as acrylonitrile and acrylamide. It is understood that the possible content of the copolymer in the polymerization medium must be determined experimentally, in such a way as to avoid any deterioration of the electrical and mechanical properties of the polymer (col. 3, lines 33-50).


It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Lee with wherein the co-monomer is a thiophene, substituted thiophene, substituted thieno[3,4-b]thiophene, dithieno[3,4-b:3',4'-d]thiophene, bithiophene, pyrrole, substituted pyrrole, phenylene, substituted phenylene, naphthalene, substituted naphthalene, biphenyl, substituted biphenyl, terphenyl, substituted terphenyl, phenylene vinylene, substituted phenylene

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vinylene, or a combination comprising at least one of the foregoing co-monomers, wherein the substituents are one or more of -H, hydroxyl, C₆-C₃₆ aryl, C₃-C₆ cycloalkyl, C₁-C₁₂ alkyl, halogen, C₁-C₁₂ alkoxy, C₁-C₁₂ alkylthio, C₁-C₁₂ perfluoroalkyl, C₆-C₃₆ perfluoroaryl, pyridyl, cyano, thiocyanato, nitro, amino, C₁-C₁₂ alkylamino, C₁-C₁₂ aminoalkyl, acyl, sulfoxyl, sulfonyl, amido, and/or carbamoyl because possible comonomers are aromatic and heterocyclic comonomers having 5 to 6 members, such as aniline, pyrrole, thiophen (and their substituted derivatives) and vinyl monomers such as acrylonitrile and acrylamide as taught by Lazzaroni (col. 3, lines 33-50).

Furthermore, the comonomer is a result-effective variable and one skilled in the art has the skill to determine the commoner that would give the desired electrical and mechanical properties of the polymer, absent evidence to the contrary. MPEP § 2141.03 and § 2144.05(b).



c. Wherein the co-monomer is , wherein R is C₁-C₁₂ primary, secondary or tertiary alkyl, cycloalkyl, C₆-C₃₆ aryl, or a functional group, as recited in claim 12.

Lazzaroni teaches that it is understood that the possible content of the copolymer in the polymerization medium must be determined experimentally, in such a way as to avoid any deterioration of the electrical and mechanical properties of the polymer (col.

3, lines 33-50).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Lee with wherein the co-



monomer is , wherein R is C₁-C₁₂ primary, secondary or tertiary alkyl, cycloalkyl, C₆-C₃₆ aryl, or a functional group because the comonomer is a result-effective variable and one skilled in the art has the skill to determine the comonomer that would give the desired electrical and mechanical properties of the polymer, absent evidence to the contrary. MPEP § 2141.03 and § 2144.05(b).

Furthermore, adding "a functional group" onto the thieno[3,4-b]thiophene does not accomplish any significant advantage to the co-monomer, where one having ordinary skill in the art has the skill to attach substituents to the thieno[3,4-b]thiophene that do not significantly effect the electrochemical polymerization reaction.

III. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Lee et al.** ("Poly(thieno[3,4-b]thiophene). A New Stable Low Band Gap Conducting Polymer", *Macromolecules* (2001), Vol. 34, pp. 5746-5747) as applied to claims 1-3 and 5-8 above, and further in view of **Lazzaroni et al.** (US Patent No. 4,663,001) as applied to claims 10-12 above, and further in view of **Jonas et al.** (US Patent No. 4,959,430) [430].

Lee and Lazzaroni are as applied above and incorporated herein.

The process of Lee and Lazzaroni differ from the instant invention because they do not disclose the following:

- a. Wherein the co-monomer is:



wherein X is C₁-C₄ alkylene or substituted C₁-C₄ alkylene, as recited in claim 13.

- b. Wherein X is C₁-C₁₂ alkyl- or C₆-C₁₂ phenyl-substituted ethylene, or a 1,2-cyclohexylene, as recited in claim 14.

Lazzaroni teaches that it is understood that the possible content of the copolymer in the polymerization medium must be determined experimentally, in such a way as to avoid any deterioration of the electrical and mechanical properties of the polymer (col. 3, lines 33-50).

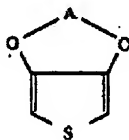
It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Lee with wherein the co-monomer is:



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wherein X is C₁-C₄ alkylene or substituted C₁-C₄ alkylene; or wherein X is C₁-C₁₂ alkyl- or C₆-C₁₂ phenyl-substituted ethylene, or a 1,2-cyclohexylene because the comonomer is a result-effective variable and one skilled in the art has the skill to determine the comonomer that would give the desired electrical and mechanical properties of the polymer, absent evidence to the contrary. MPEP § 2141.03 and § 2144.05(b).

Jonas '430 teaches the monomer:

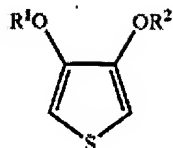


wherein A is an optionally substituted C₁-C₄ alkylene radical (col. 2, lines 44-61).

IV. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Lee et al.** ("Poly(thieno[3,4-b]thiophene). A New Stable Low Band Gap Conducting Polymer", *Macromolecules* (2001), Vol. 34, pp. 5746-5747) as applied to claims 1-3 and 5-8 above, and further in view of **Lazzaroni et al.** (US Patent No. 4,663,001) as applied to claims 10-12 above, and further in view of **Jonas et al.** (US Patent No. 4,910,645) ['645].

Lee and Lazzaroni are as applied above and incorporated herein.

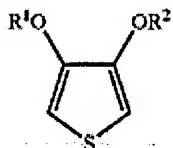
The process of Lee and Lazzaroni differ from the instant invention because they do not disclose wherein the co-monomer is:



wherein R_1 and R_2 are each independently -H, C_1 - C_4 alkyl, phenyl, or substituted phenyl, as recited in claim 15.

Lazzaroni teaches that it is understood that the possible content of the copolymer in the polymerization medium must be determined experimentally, in such a way as to avoid any deterioration of the electrical and mechanical properties of the polymer (col. 3, lines 33-50).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Lee with wherein the comonomer is:



wherein R_1 and R_2 are each independently -H, C_1 - C_4 alkyl, phenyl, or substituted phenyl because the comonomer is a result-effective variable and one skilled in the art has the skill to determine the commoner that would give the desired electrical and mechanical properties of the polymer, absent evidence to the contrary. MPEP § 2141.03 and § 2144.05(b).

Jonas '645 teaches the monomer:



wherein R₁ and R₂ are each independently -H, C₁-C₄ alkyl, phenyl, or substituted phenyl (col. 2, lines 10-18).

V. Claims **16 and 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Lee et al.** ("Poly(thieno[3,4-b]thiophene). A New Stable Low Band Gap Conducting Polymer", *Macromolecules* (2001), Vol. 34, pp. 5746-5747) as applied to claims 1-3 and 5-8 above, and further in view of **Jonas et al.** (US Patent No. 5,300,575) ['575].

Lee is as applied above and incorporated herein.

The process of Lee differs from the instant invention because Lee does not disclose the following:

a. Wherein the monomeric composition further comprises a polyanion, as recited in claim 16.

Jonas '575 teaches that the polythiophenes get positive charges by the oxidative polymerization (col. 3, lines 16-19).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Lee with wherein the monomeric composition further comprises a polyanion because thieno[3,4-b]thiophene would have gotten positive charges by the oxidative polymerization as taught by Jonas '575 (col. 3, lines 16-19). The polyanions would have compensated or neutralized the

positive charges.

b. Wherein the polyanion is a polycarboxylate or a polymeric sulfonate, as recited in claim 17.

Jonas '575 teaches that the polyanions are anions of polymeric carboxylic acids and polymeric sulfonic acids (col. 2, lines 45-52).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Lee with wherein the polyanion is a polycarboxylate or a polymeric sulfonate because anions of polymeric carboxylic acids and polymeric sulfonic acids are conventional polyanions in polythiophene dispersions as taught by Jonas '575 (col. 2, lines 45-52).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edna Wong whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

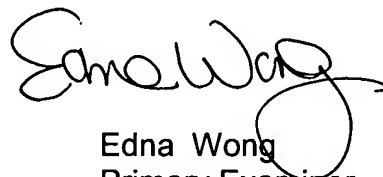
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

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Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Edna Wong
Primary Examiner
Art Unit 1753

EW
January 6, 2006